

What is claimed is;

1. A system for generating an optical signal, the system comprising:
a plurality of diodes, each diode having an input and an output;
a combiner having a plurality of inputs and an output, the plurality of inputs coupled to the outputs of the plurality of diodes; and
a control circuit, coupled to the input of each of the plurality of diodes, the control circuit programmable to selectively switch on ones of the plurality of diodes to produce an optical output signal at the output of the combiner with selective control of temporal, spectral and amplitude aspects of the optical signal.
2. The system of claim 1, wherein each diode of the plurality of diodes emits light with a selected frequency.
3. The system of claim 1, wherein each diode of the plurality of diodes is one of a telecommunications diode, a connectorized diode, a microchip laser diode, and a passively q-switched diode.
4. The system of claim 1, wherein the combiner comprises a number of separate combiners coupled together to provide a plurality of inputs and one output.
5. The system of claim 1, wherein the combiner comprises a fiber star connector.
6. A system for generating an optical signal, the system comprising:
a plurality of light emitting devices, each light emitting device having an input and an output;
a combiner having a plurality of inputs and an output, the plurality of inputs coupled to the outputs of the plurality of light emitting devices and the output providing a composite signal; and
a control circuit, coupled to the plurality of light emitting devices, wherein the control circuit controls the plurality of light emitting devices to shape the composite signal in time, frequency, and amplitude.

7. The system of claim 6, and further including a user interface, coupled to the control circuit, the user interface for receiving signals for defining a desired shape for the composite signal.
8. The system of claim 6, wherein each of the light emitting devices comprises one of a telecommunications diode, a connectorized diode, a microchip laser diode, and a passively q-switched diode.
9. The system of claim 6, wherein the combiner comprises a number of separate combiners coupled together to provide a plurality of inputs and one output.
10. The system of claim 6, wherein the combiner comprises a fiber star connector.
11. A method for generating an optical signal, the method comprising:
 - selecting at least one of amplitude, time and frequency characteristics for the optical signal;
 - generating a set of control signals to achieve the selected characteristics of the optical signal;
 - applying the control signals to a plurality of discrete light emitting devices to produce a set of output optical signals with time, frequency and amplitude characteristics based on the selected characteristics for the optical signal;
 - selectively combining the output optical signals from the discrete light emitting devices to produce the optical signal; and
 - outputting the optical signal.
12. An apparatus comprising:
 - an optical pulse shape generator, including:
 - a plurality of light emitting devices, each light emitting device having an input and an output;

a combiner having a plurality of inputs and an output, the plurality of inputs coupled to the outputs of the plurality of light emitting devices and the output providing a composite signal; and
a control circuit, coupled to the plurality of light emitting devices, wherein the control circuit controls the plurality of light emitting devices to shape the composite signal in time, frequency, and amplitude;
an optical amplifier, coupled to the output of the optical pulse shape generator;
and
a delivery system, coupled to the output of the optical amplifier, for delivering the output to a selected target.

13. The apparatus of claim 12, wherein the optical amplifier comprises one of a gas laser, a solid state laser, and a fiber laser.

14. The apparatus of claim 12, wherein the optical amplifier includes an optical pre-amplifier and an optical power amplifier coupled in series with the output of the optical pulse shape generator.

15. The apparatus of claim 12, wherein the delivery system comprises at least one of an optical fiber and at least one fiber optic lens.

16. The apparatus of claim 12, and further including a user interface, coupled to the control circuit, the user interface for receiving signals for defining a desired shape for the composite signal.

17. The apparatus of claim 12, wherein each of the light emitting devices comprises one of a telecommunications diode, a connectorized diode, a microchip laser diode, and a passively q-switched diode.

18. The apparatus of claim 12, wherein the combiner comprises a number of separate combiners coupled together to provide a plurality of inputs and one output.

19. The apparatus of claim 12, wherein the combiner comprises a fiber star connector.
20. A method for generating an optical signal, the method comprising:
selecting at least one of temporal, spectral and amplitude aspects of the optical signal to be generated;
generating control signals for a plurality of light emitting devices to achieve the selected aspects of the optical signal;
applying the control signals to the plurality of light emitting devices; and
optically combining the outputs of the plurality of light emitting devices to produce the optical signal.
21. The method of claim 20, wherein selecting at least one of temporal, spectral and amplitude aspects of the optical signal to be generated comprises selecting temporal, spectral and amplitude values to produce an optical signal that decreases from an initial amplitude in steps to a final amplitude over discrete time intervals during the duration of the optical signal.
22. The method of claim 20, wherein optically combining the output signals comprises combining the outputs of the light emitting devices in a star coupler.
23. The method of claim 20, wherein applying the control signals to the plurality of light emitting devices comprises applying the control signals to a plurality of diodes.
24. A system for generating an optical signal, the system comprising:
a plurality of independent light sources;
means for generating control signals for the plurality of independent light sources to generate the optical signal with selected temporal, spectral and amplitude components;
and

means, coupled to the plurality of independent light sources, for optically combining the outputs of the plurality of independent light sources to produce the optical signal.

25. A system for shaping an optical pulse, the system comprising:

a plurality of light emitting diodes, each diode having an input and an output and adapted to produce emit light at a selected frequency;

a combiner having a plurality of inputs and an output, the plurality of inputs selectively coupled to respective ones of the outputs of the plurality of light emitting diodes;

a control circuit, coupled to the input of each of the plurality of light emitting diodes, the control circuit including a drive circuit that is programmable to selectively switch on ones of the plurality of diodes to produce an optical output signal at the output of the combiner with selective control of temporal, spectral and amplitude aspects of the optical signal; and

a user interface, coupled to the control circuit, the user interface for receiving signals for defining a desired shape for the optical signal.